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ABSTRACT

Nearly a quarter of a century ago, John G. Nicholls proposed the four developmental levels of motivational reasoning that focused upon the roles that ability and effort play in academic success. These levels theoretically begin at early childhood and end at adolescence. This report attempts to validate the developmental and predictive nature of this theory with college students through the use of a survey instrument designed to tap each of the four levels. Empirical support for the developmental nature of this theory of motivational differentiation was weaker than anticipated and predictive validity was generally lacking. Even when general agreement or disagreement to the statements of motivational beliefs was found as predicted by the theory, such beliefs about motivation were sometimes not predictors of college academic success. Possible explanations for the findings are provided for future research in this area. Survey used in study is appended.
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Searching for Predictive and Developmental Validity in a Motivational Reasoning Hierarchy

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Abstract

Nearly a quarter of a century ago, John G. Nicholls proposed the four developmental levels of motivational reasoning that focused upon the roles ability and effort play in academic success. These levels theoretically begin at early childhood and end at adolescence. The current preliminary report attempted to validate the developmental and predictive nature of this theory with college students through the use of a survey instrument designed to tap each of the four levels. Empirical support for the developmental nature of this theory of motivational differentiation was weaker than anticipated and predictive validity was generally lacking. Even when general agreement or disagreement to the statements of motivational beliefs was found as predicted by the theory, such beliefs about motivation were sometimes not predictors of college academic success. Possible explanations for the findings are provided for future research in this area.

Searching for Predictive and Developmental Validity in a Motivational Reasoning Hierarchy

John G. Nicholls (1940 -1994) was a prolific researcher who made considerable contributions to many areas of educational psychology. Many of his contributions were in the arena of motivation and more specifically our thinking about how ability, effort, and other attributional variables (skill, luck, intelligence, and task difficulty) influence school achievement. He is also well known for differentiating ego orientation and task orientation in schoolwork. The four developmental levels of reasoning about the roles ability and effort play in academic achievement outcomes as proposed by John G. Nicholls (1978, 1990) are fairly well accepted in many professional circles.

The acceptance of this theory within the field of educational psychology might be measured by the extent to which references to the theory are continually made by leaders in the field and descriptions appear in high status publications. Pintrich and Shunk (2002) stated: "Nicholls and his colleagues have documented a four-level developmental pattern in the beliefs between effort and ability" (p. 130). Berliner and Calfee (1996) in their Handbook in Educational Psychology (A project of Division 15, The Division of Educational Psychology of the American Psychological Association) included a brief description of the 4-levels of ability

and effort differentiation proposed by Nicholls (see p. 137). A DialogWeb Social Science Citation Index Search for the Nicholls (1978) article yielded 309 instances where authors had cited this reference over the past decades.

A brief overview of the four-levels of reasoning proposed by Nicholls will be provided for the reader as a point of reference and an avenue of later departure. In what might be considered the classic study, Nicholls (1978) hypothesized that developmental changes in reasoning about ability, effort, and outcomes could influence achievement behavior. Causal schemes related to beliefs about motivation are believed to be a powerful influence upon school success and failure. His primary subjects were 16 school children (8 boys and 8 girls) in each of nine age-categories (5 through 13) in New Zealand (a total of 144 children). These subjects were shown film segments of school children working at a task and interviewed regarding such key questions as: "Who is working harder?" "Is one cleverer or are they the same?" "How come they got the same when one worked hard and one didn't work hard?" and "Would you like to be like these children?" The ingenious nature of evaluating the responses of young children in a projective atmosphere deserves to be noted here.

The empirical results from this study (Nicholls, 1978) generated the following age-related hierarchical theory of reasoning about ability and effort.

The basic tenets are provided below in summarized form:

Level 1: Effort and outcome are not distinguished as cause and effect....

Children center on effort (people who try harder are smarter even if they get a lower score) or, less commonly, on outcome (people who get a higher score are said to work harder, even if they do not, and to be smarter).

Level 2: Effort and outcome are distinguished as cause and effect. Effort is the prime cause of outcomes: Equal effort is expected to lead to equal outcomes.

Ability, in the sense of capacity which can increase or limit the effectiveness of effort, is not suggested as a cause.

Level 3: The concept of ability is used intermittently. Effort is not the only cause of outcomes. Explanations of equal outcomes following different effort involve suggestions such as: The person trying less is faster, brighter, has a better understanding, or is naturally good at the activity.

Level 4: The concept of ability, in the sense of capacity which, if low, may limit or, if high, may increase the effectiveness of effort, is used systematically in explanations of observed behavior and outcomes and in predictions of outcomes when both students try hard. Ability is correctly inferred from effort and outcome, and outcomes are seen as determined jointly by effort and ability.

Nicholls (1978) detected clear age trends in the levels of reasoning where ability and effort were used to explain achievement outcomes. He suggested, "these levels appear to satisfy the criteria of an invariant sequence of qualitatively different, hierarchically integrated, levels of reasoning" (p. 805). For example, the majority of 13-year old subjects ($n=12$ or 75%) were reasoning at Level 4 and the remaining subjects ($n=4$ or 25%) were functioning at Level 3. Nicholls employed cognitive developmental theory to explain this finding by stating that "it was predicted that formal operational thought would be necessary for what would be necessary for what was assumed to be the adult response represented by level 4" (p. 805).

Unfortunately, Nicholls compared child and teacher ratings of academic achievement in the classroom according to different ages and self concept with standardized test results (reading comprehension and vocabulary) at motivational

reasoning levels 2-4. A less convoluted research approach would have been to examine the interaction of motivational reasoning with actual school performance.

Even well establish theories need to be held to continual scrutiny by theorists, researchers, and practitioners in order to advance the scientific integrity of knowledge and search for theoretical models that adequately predict achievement. Every worthy theory should be able to withstand the repeated test of replication, validation, and application. A search for published attempts to validate the four-level motivational hierarchy as a predictor of achievement as proposed by Nicholls resulted in a paucity of findings in the research literature. Since theory building is an on-going process, there is always a need for empirical investigations that attempt to validate, further elaborate, and extend the work done by pioneers in the field.

The current preliminary report is an attempt to empirically test the developmental nature and predictive validity of student differentiation of ability and effort as causal factors in college achievement. Since Nicholls was attempting to explore the causal explanations of young children (ages 5-13), it was necessary to carefully develop film clips of actual schoolchildren specifically cued to represent specific learning circumstances. Children needed to relate to these

scenes, project themselves into the scenes, be aware of their own thoughts related to the situations, and articulate their explanations of learning situations based upon carefully constructed questions. An obvious methodological advantage of the present study lies in the fact that adult college students should possess the cognitive, emotional, reflective, and linguistic maturity to respond to survey items that might explain academic achievement.

If the theory proposed by Nicholls is valid, the following two outcomes should emerge from the findings: (1) most college students should hold motivational dispositions at the highest stage (Level 4) and (2) college classroom success should be positively related to agreement with Level 4 statements and inversely related to lower stages (Levels 1-3).

Method

Subjects ($n=66$) were student volunteers (mostly juniors and seniors) in two undergraduate educational psychology courses at the State University of New York. SUNY Potsdam is a small liberal arts campus setting with approximately 4,000 undergraduate students in the rural, northern region of New York State. A clue to the academic caliber and selectivity of the institution might be obtained

from the fact that mean S.A.T. scores for the entering 1996 freshman class were 480 verbal and 520 mathematics (A.C.E., 1997). Data collection for the current study was performed during the fall semester of 2000.

A 19-item survey instrument (See Appendix A) was created and administered to subjects that reflected various relationships between ability, effort, and achievement outcomes depicted in the four levels of motivational reasoning (Nicholls, 1978, 1990). The nineteen survey items were written to depict the following motivational levels: Level #1 (n=1), Level #2 (n=5), Level #3 (n=2), and Level #4 (n=11). Often the basic wording of the survey statements was taken directly from the published works of Nicholls. A total of 10 survey items also included reference to the term "exam" in an attempt to engage respondents in thinking about their own individual course achievement. Subjects were asked to rate their agreement, uncertainty, or disagreement on a five-point scale regarding how these statements reflected their personal explanations of academic performance.

Academic achievement was measured by the total cumulative points (450 possible) earned in the course. Most points earned in the class (400 points) were derived from multiple-choice exams where the majority of items were written to

tap knowledge well above the simple recall of factual knowledge. An essay exam (50 points) constituted the remainder of the point total for class achievement.

Results

A descriptive analysis of the data set yielded some general support for the theoretical viewpoint. Respondents generally agreed (50% or more SA or A) with all but two items (#10 & #17) of the eleven Level 4 statements. The margin of disagreement (SD and D) to these same eleven items was sometimes quite substantial (Item #17: 34%) with seven items capturing 20% or more disagreement responses. Quite surprisingly, four of the eight Level 1-3 items (#1, #3, #7, #13) attracted general agreement (50% or more SA or A) at substantial levels (71-84%). For example, in Item #1 71% of subjects generally agreed with the Level 2 belief: "Effort and exam outcome are best thought of in terms of cause and effect." Even when agreement was not at the dominant 50% or more SA or A level, substantial numbers of students appear to have adopted lower-level beliefs. For example, some 28% of subjects generally agreed (SA or A) with the Level 2 (Item #2) belief: "Equal effort is expected to lead to equal outcomes."

The correlation coefficients between the nineteen motivational belief statements and actual student exam achievement were suppressed. Only two Level 3 items (#7 and #9) out of all 19 items were found to be statistically significant ($r=.22^*$). Nearly half of the correlation coefficients were zero-ordered.

Even when general agreement or disagreement was found amongst survey items that fit the theory, relationships to actual college performance were extremely suppressed and sometimes in opposite theoretical directions from what would have been predicted. Three Level 1-3 items (#1, #7, and #9) were found to be correlated in opposite directions as predicted by the theoretical model. The eleven items reflecting the highest level of motivational reasoning yielded only one Level 4 item (#17) that was seriously reversed from theoretical predictions.

Discussion

Empirical support for the developmental nature of this theory of motivational differentiation was weaker than anticipated and predictive validity was seriously lacking. The student patterns of agreement and disagreement to motivational statements at Levels 1-4 present an interpretive dilemma. The fact that the only two items (#7 and #9) that were found to be statistically significant

predictors of class achievement were also correlated in the reversed direction from the theoretical predictions only adds to this disturbing scenario. The current circumstance calls for a careful examination of the results of previous experiments and a method of explaining the current findings.

Herman (1998) used qualitative data to support the theory proposed by Nicholls that successful college academic achievement was highly related to Level 4 ability/effort distinctions and lower performance was related to other explanations (Levels 1-3). In general, successful college students held more sophisticated views of the relationship between ability, effort, and academic outcomes. Unfortunately, this open-ended response format was only designed as an exploratory study and compared high achievers with low achievers. The motivational dispositions of those students in the moderate achievement range were not included in this analysis. It seems unlikely that the contrasting results found in the current study are only due to lack of the middle group of achievers being included in the study or quantitative/qualitative methodological research design issues.

What was surprising in the current study was that so many adult college-level students held such immature beliefs about effort and ability. Herman

(1998) had previously called into question the belief that: "nearly all college-level students should have already formulated adult-like conceptions of ability/effort issues such as seeing ability as capacity, recognizing that ability and effort can co-vary, and ability acts as a limitation and can constrain effort" (p. 9).

Focus group feedback from a pilot study for the current study indicated that several students perceived that the survey statements were worded in a confusing manner. Other clues to explain the outcomes included multiple meanings of the key terms. For example, students thought of the term "ability" not only as innate capacity (entity view) and changeable (incremental view), but also as an outcome, such as possessing the "ability" to perform a task. Some college students also seemed to not consider ability as a variable, since all college students were assumed to possess a similar ability to succeed based upon SAT/ACT entrance requirements in place.

The incongruent findings of the current study could also be a result of weaknesses in the theoretical model. Herman (1998) pointed out that Nicholls originally generated this theory on 16 subjects (8 boys and 8 girls) at nine different age levels and that such children were from economically "advantaged" regions of New Zealand. The nature of a relatively small sample of students (eight

boys and eight girls) from each age level, non-representative social economic status (S.E.S.) nature of the population from which the sample was drawn, and unique culture of New Zealand were all limitations of the Nicholls study.

Nicholls (1990) did not suggest that adults would always function with Level 4 schemes for academic work such as when he stated: "Indeed, in many circumstances there is much to be said for forgetting about one's ability and using childlike or even infantile conceptions of competence" (p. 9). It remains unclear how prevalent or pervasive such motivational reasoning might be among college students.

Clearly, more research needs to be conducted to answer the disconcerting questions raised concerning the less than impressive developmental and predictive validity of this established theory. The current report was designed as an APS Convention poster session in order to offer the initial quantitative results of the study. Since the current sample ($n=66$) was only a portion of the larger sample that still needs to be analyzed, the analysis of the entire data set might offer greater clarity. During data collection, the subjects were also encouraged to provide written (free response) explanations for their responses to the 19 items. It is hoped that the future analysis of such explanatory responses and the entire data set will

offer valuable clues that could lead to the more powerful interpretation of the results presented here. The tentative nature of the conclusions drawn here will be supplemented by the reporting of the results for the entire sample and the qualitative data for responses in the future.

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Table 1
Descriptive Results and Correlations Between Motivational Survey
Items and Achievement

Strongly Agree	Agree	?	Disagree	Strongly Disagree	Correlation with Exams
Item #1 Level 2 (Effort and exam outcomes are cause and effect.)					
17%	54%	11%	15%	4%	.13
Item #2 Level 2 (Equal effort produces equal exam outcomes.)					
3%	25%	7%	48%	15%	-.04
Item #3 Level 2 (Effort can increase ability.)					
27%	57%	7%	6%	2%	-.09
Item #4 Level 2 (Two students with same scores differ in effort application.)					
2%	11%	27%	47%	13%	-.07
Item #5 Level 4 (Ability can increase with practice.)					
7%	68%	14%	11%	0%	-.00
Item #6 Level 1 (Those who try harder are smarter, even if they do poorly.)					
3%	7%	15%	52%	23%	-.14
Item #7 Level 3 (Ability encompasses both competence and effort.)					
22%	55%	14%	7%	2%	.22*
Item #8 Level 4 (When two students get different exam scores, the person scoring higher with less effort is more able.)					
13%	40%	20%	24%	3%	.09

Item #9 Level 3 (Ability is best thought of as a fixed capacity.)

0%	10%	20%	47%	23%	.22*
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Item #10 Level 4 (When two students obtain equal exam scores following different effort, the person trying less is faster, brighter, etc.)

8%	39%	24%	25%	3%	-.05
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Item #11 Level 4 (Ability can increase or be fixed depending upon the situation.)

5%	55%	19%	20%	1%	-.03
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Item #12 Level 4 (Exam scores are determined jointly by effort and ability.)

16%	56%	7%	16%	5%	.06
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Item #13 Level 2 (The student who tried less will improve if he/she tries harder.)

22%	51%	15%	12%	1%	-.17
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Item #14 Level 4 (Ability as capacity if low, may limit or, if high, may increase the effectiveness of constant effort.)

6%	59%	31%	4%	0%	.11
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Item #15 Level 4 (Effort can influence outcomes demanding skill, but not luck.)

13%	55%	15%	16%	2%	.11
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Item #16 Level 4 (Exam tasks where fewer peers succeed are judged harder and needing higher ability.)

7%	54%	21%	16%	2%	.05
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Item #17 Level 4 (The effect of effort on performance is constrained by ability.)

2%	39%	25%	31%	3%	-.15
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Item #18 Level 4 (Trying hard tells me and others about my capabilities.)

14%	55%	12%	18%	2%	.13
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Item #19 level 4 (Unequal effort can lead to equal performance.)

14%	45%	19%	17%	5%	.12
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* $p < .05$

Appendix A

ABILITY AND EFFORT EXPLANATIONS

Directions: This survey contains several statements regarding your personal beliefs about how effort and ability are related to your academic performance. Read each item very carefully and decide your degree of agreement or disagreement with these statements. Place the proper code in the (parenthesis) representing your response in the blank.

Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
(SA)	(A)	(?)	(D)	(SD)

1. _____ Effort and exam outcome are best thought of in terms of cause and effect.
2. _____ Equal effort is expected to lead to equal exam outcomes.
3. _____ Effort can sometimes increase a person's ability.
4. _____ When two people get the same exam score; but differ in effort, the best explanation is that the student who tried less probably worked really hard for a while or misapplied effort (e.g., went too quickly and made mistakes).
5. _____ Ability is best thought of as being able to increase with practice.

6. _____ People who try harder are smarter, even if they get a lower score on the exam.
7. _____ Ability encompasses both competence and effort.
8. _____ When two people get very different exam scores, the person getting the higher score with less effort must be, in some sense, more able.
9. _____ Ability is best thought of as a fixed capacity.
10. _____ Think about when two people obtain equal exam scores following different effort. The person who is trying less is faster, brighter, has a better understanding, or is naturally good at the activity.
11. _____ Ability can be thought of as able to increase or be a fixed capacity depending upon the learning situation.
12. _____ Exam scores are determined jointly by effort and ability.
13. _____ The student who tried less will improve if he/she tries harder.
14. _____ The concept of ability, in the sense of capacity, if low, may limit or, if high, may increase the effectiveness of effort on performance when both students try hard.
15. _____ Effort can influence outcomes on a skill task, but not on a task where performance is based upon luck.
16. _____ Exam tasks that fewer peers can succeed on are judged to be harder and needing higher ability.

17. _____ The effect of effort on exam performance is constrained by ability.
18. _____ Trying hard tells me (and others) about my capabilities.
19. _____ Unequal effort can lead to equal exam performance.